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The credit squeeze during Russia's early transition

A bank-based view[1]

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Abstract

This paper asks whether Russia's protracted inflation stabilization might have caused a credit squeeze and hence might have contributed to the output collapse in the first three years of the Russian transition. Russian monetary policy was not restrictive as a whole. Still, the occurrence of a credit crunch is not excluded, because of the Russian central bank's heavy reliance on required reserves to curb the inflationary effects of monetized budget deficits. Due to methodological limitations, we are forced to concentrate on a cross-sectional analysis of bank liquidity in 1994, in order to find possible indications about Russia's monetary stance from the point of view of the lending channel. We cannot reject that the huge excess reserves of Russian banks in 1994 were at least partially due to excess liquidity. This suggests that there is no direct relation between the monetary policy of high required reserves and the observed credit crunch. The question of why banks preferred to hold excess liquidity deserves further attention. This question is still relevant, because Russian commercial banks have again accumulated excess reserves in 1999, in the aftermath of the banking crisis, triggered by the August-1998 crisis.

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1. Introduction

Russia experienced high inflation during early transition. This was mainly due to the soft monetary policy of the central bank of Russia (CBR). The softness of the CBR is easily observed in Figure 1 and Table 1 below. It is clear from Table 1 that the growth of CBR-credit was very high in 1992–94. Figure 1 shows that the main beneficiary of central bank credits was the government, which covered its budget deficit through access to the money printing press. Other main beneficiaries were the CIS-countries,[2] and the commercial banks. However the evidence on commercial banks is dubious. They received huge amounts of credits at low nominal interest rates (before 1994 negative real interest rates), but the banks also held large sums of reserves with the central bank at zero nominal interest rates in the form of required reserves and excess reserves. In column 5 of Table 1, we subtracted these reserves of commercial banks at the central bank from the stock of CBR-credit to the commercial banks and calculated the growth rate of the resultant stock of net credit to commercial banks. We observe that the growth of net CBR-credit to commercial banks has been as much negative as it has been positive during 1992–95. So the monetary policy in that period with respect to commercial banks is not clear.

Figure 1. Credit of the CBR (as percentage of monthly GDP)

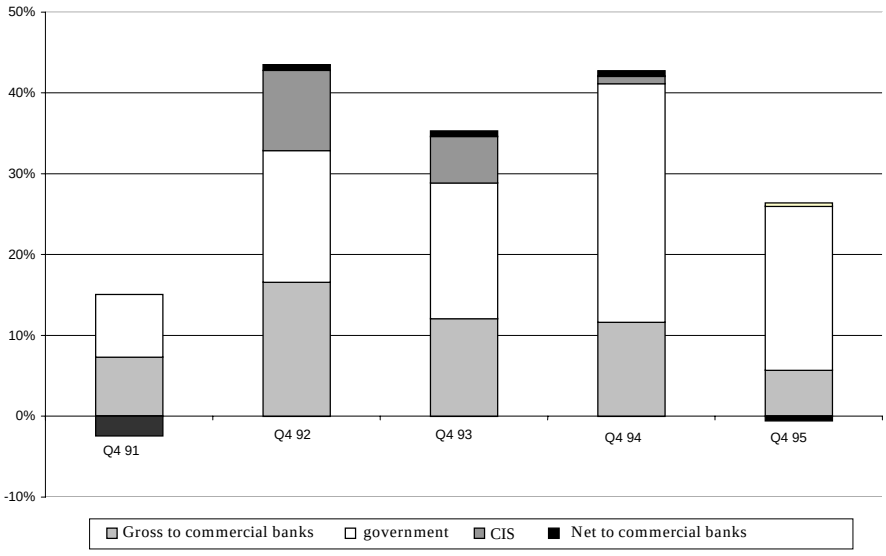

Table 1. Credit expansion of the CBR during early transition

Quarter	Growth of nominal credit of the CBR				
	Credit to commercial banks (1)	Credit to the government (2)	Credit to CIS-countries (3)	Total credit of the CBR (4)	Net credit to commercial banks (5)
Q1 92	113%	0%	NA	80%	–56%
Q2 92	99%	242%	489%	182%	588%
Q3 92	127%	155%	251%	164%	150%
Q4 92	103%	107%	33%	85%	–130%
Q1 93	48%	48%	51%	53%	290%
Q2 93	39%	39%	39%	35%	249%
Q3 93	49%	51%	25%	42%	36%
Q4 93	9%	52%	1%	26%	–74%
Q1 94	20%	47%	1%	34%	–232%
Q2 94	25%	71%	8%	43%	60%
Q3 94	24%	54%	13%	42%	254%
Q4 94	62%	42%	–57%	38%	–140%
Q1 95	31%	1%	0%	9%	393%
Q2 95	–12%	18%	0%	7%	–192%
Q3 95	4%	27%	0%	20%	–50%
Q4 95	–1%	11%	–5%	8%	–3%

Source: Own calculations based on data from *Russian Economic Trends.*

At the same time we observe that bank lending to the economy decreased substantially during early transition. Table 2 clearly shows the gradual decrease of banks' credits to the economy, relative to gross investment. The question is whether this credit squeeze can be attributed to monetary policy or is due more to other factors.

Monetary policy transmission is still a puzzle. It is widely accepted that restrictive monetary policy raises interest rates and decreases **loan demand** and investment. This is referred to as the money channel. There exist a number of other transmission channels that affect **loan supply** rather than loan demand. This is clearly the case in Russia (see Table 2). The **lending channel** has received broad academic interest lately. All models of the lending channel of monetary transmission lean on a particular capital market imperfection as a necessary condition, namely the imperfect substitutability of loans and publicly issued

[2] Until the end of 1994, when all CIS (Commonwealth of Independent States) countries had established their own currencies, war-ridden Tajikistan excluded.

bonds for both banks and firms (see for example Bernanke and Blinder, 1988; Kashyap and Stein, 1993). These imperfections imply that restrictive monetary policy affects bank liquidity and hence the loan supply. Since enterprises do not have perfect substitutes for bank lending, they are adversely affected by this lower loan supply. Another channel operates via moral hazard. More restrictive monetary policy and higher interest rates might affect the behaviour and creditworthiness of enterprises (moral hazard) and banks might react by constraining loan supply. This is commonly referred to as the financial accelerator or the **balance sheet channel** (Mishkin, 1996).

Table 2. Russia's credit crunch illustrated

	1992	1993	1994	1995	1996
Bank credit to economy/GDP	33.6%	20.4%	19.6%	12.0%	10.0%
Total bank assets/GDP	88.0%	54.0%	56.0%	36.0%	36.0%
Bank credit/total bank assets	38.2%	37.8%	35.0%	33.3%	27.8%
Gross fixed capital formation /GDP	24.7%	21.0%	22.0%	21.2%	21.0%

Source: OECD, 1997, p. 87.

In addition to monetary policy, other factors may have a direct effect on the loan supply. We give some examples. First, risk-based capital regulations can play a role (see Bernanke and Lown, 1991; Brinkman and Horvitz, 1995; Peek and Rosengren, 1995). Second, autonomous shifts in enterprises' creditworthiness due to shocks in the economic environment might affect loan supply. The only difference from the balance sheet channel is that creditworthiness is not affected by higher interest rates but by autonomous factors. Transition from a centrally planned economy to a market economy and the protracted inflation stabilization are obvious examples. Third, bank decentralization or privatization might affect loan supply (see for example Dewatripont and Maskin, 1995; Berglöf and Roland, 1998). This is a typical feature of transition economies. Last, we could look at the Russian banking system as a structurally inefficient and unreliable system, with distorted incentives. Several features follow from this, such as an inefficient payment system, the lack of other safe investment opportunities and the lack of qualitative loan demand. These factors might affect liquidity management and lending behaviour too. The most important characteristic of this environment might have been the predominance of soft budget constraints in the banking sector. Banks might for several reasons be passive in enforcing bad loans and thereby create soft budget constraints for enterprises and lower loan quality. O'Hara (1993) describes how banks can hide losses and roll over insolvent debtors in order to increase their own market value. Mitchell (1998) considers the

bankruptcy threat for banks as a source of bank passivity in enforcing bad loans.[3] Schoors and Sonin (2000) show a model where creditor passivity can emerge as a stable Nash-equilibrium due to enforcement externalities. Perotti (1998) describes how inertial behaviour by creditors may be rational, because it causes pressure for a collective bail-out. Stiglitz (1994) analyzes how banks in distress might gamble for resurrection by financing high-risk projects with high possible outcomes but with low expected value. Dewatripont and Maskin (1995) show in their seminal model that soft budget constraints might arise in any economy as a result of a market institution failure. In their model, banks cannot credibly commit not to refinance bad projects, because refinancing is profitable. This affects *ex ante* manager incentives and in this way the *ex post* efficiency of banks creates *ex ante* inefficient financing and more bad loans. Asymmetric information, distinctively present in Russia, is crucial in their paper. Reconciling the predominance of soft budget constraints with the observed credit crunch seems awkward. This is explained in Berglöf and Roland (1997), where there is a credit crunch in respect of new lending because refinancing is more profitable than new lending. One general outcome predicted by the soft budget constraint literature on banks is the decreased creditworthiness of borrowers. This might of course affect loan supply and liquidity as in Berglöf and Roland (1995).

The purpose of this paper is to verify whether the Russian credit squeeze was triggered by overly repressive monetary policy with respect to banks, or was rather due to the other factors mentioned above. This is an important question since the credit squeeze in early transition might have contributed to the excessive output collapse in Russia, as it did in other transition countries (see Calvo and Coricelli, 1993). If the credit squeeze can be explained as a monetary policy phenomenon, some of the output loss could have been avoided by a more appropriate monetary policy.

There has been some literature on the stance of Russian monetary policy in early transition. Granville (1995) evaluates Russia's monetary policy in 1992–94 and finds that at no time in that period was there a tight monetary stance. This point of view is confirmed by a number of authors such as Åslund (1993), Sachs (1994), or Baliño, Hoelscher and Horder (1997). The literature has, however, implicitly concentrated on the money channel of monetary policy transmission. The lending channel was largely neglected, while it is bound to play an important role in Russia, because of severe capital market imperfections. Indeed in Russia there was hardly any substitution at all. There was (and is) no liquid market in corporate bonds either for banks or for enterprises. Russian banks could not substitute bonds for deposits and Russian enterprises could only finance with either retained earnings or bank credit. In such an environment, repression of commercial banks can affect bank liquidity, and hence bank lending and

[3] However this was not applicable to the Russian banking sector until March 1999. Before, banks could not be declared bankrupt, because banks were explicitly excluded from the bankruptcy legislation. Only in March 1999 did Russia adopt a bankruptcy procedure applicable to banks.

corporate investment. This is the lending channel at work. Since the lending channel runs through changes in bank liquidity, it is a necessary condition for the lending channel to work that bank liquidity be negatively affected due to monetary policy shocks. Therefore our main research question is whether Russian banks were liquidity constrained in 1994. It is sufficient to reject a necessary link in a chain in order to reject the whole chain.[4] There is one serious problem with this approach. In order to test the bank lending channel unambiguously, we should work with panel data and analyze how monetary policy shocks induce changes in bank liquidity and bank lending, along the lines of Kashyap and Stein (1993). On the other hand, we want to analyze the specific period of early transition (1992–94) where the credit crunch and the fall in production were very considerable to find out whether monetary policy might have played a role. The problem then is that this period is too short for time series analysis. Also, we could only find representative data of acceptable quality for 1994. Therefore we are methodologically limited to a cross-sectional analysis of **bank liquidity** with the use of individual bank data. This will lead us to interpret any conclusions with respect to the bank lending channel with due caution and concentrate on bank liquidity itself in the rest of the paper. Section 2 provides a theoretical discussion on liquidity of Russian banks and formulates research hypotheses. Section 3 describes the data. In Section 4 we present results. Section 5 concludes.

2. The paradox of bank liquidity

2.1 The repressive character of required reserves

Required reserves are funds which banks have to deposit with the central bank. Usually they are defined as a proportion of certain classes of liabilities, mostly deposits. Central banks claim to apply reserve requirements as an instrument to secure the bank sector against systemic risk and as an instrument of monetary policy. There exist however better instruments to achieve these goals. Systemic risk is better contained by good prudential control and supervision and properly priced deposit insurance. Kanatas and Greenbaum (1982) have shown that monetary policy is better off with voluntary and interest earning reserves at the central bank than with obligatory reserves that earn no or low interest. Galbraith and Rymes (1993) have shown that the central bank can better conduct its monetary policy by properly setting overdraft rates in its function as clearing centre in the payments system. In practice, required reserves often pay interest rates below the market rate (sometimes even zero). This cannot be motivated from the point of view of systemic risk or the conduct of monetary policy and therefore reveals the true nature of these requirements: required reserves are primarily an

[4] Note however that, if we could not reject out null hypothesis, this would not constitute a confirmation of the bank lending channel, since many other interpretations remain open.

instrument of financial repression (see McKinnon and Mathieson, 1981) and offer a cheap source of financing to the state budget. For these reasons repressive reserve requirements have gradually been replaced by market-based instruments in OECD-countries. However, since in most transition countries financial markets are weakly developed, alternative instruments are not readily available. Therefore reserve requirements play an important role in the monetary policy of transition countries[5] The implicit tax income from issuing cash and reserves is commonly referred to as seigniorage. Seigniorage income can be calculated according to two methods, namely the cash flow definition and the opportunity cost definition. The cash flow definition assumes that reserves are similar to currency. Revenue to the budget is the growth in reserves minus the interest possibly paid on these reserves. This definition implies that the implicit tax revenue from reserves can be negative, namely if reserves decrease nominally. The opportunity cost definition takes another stance. This approach assumes that reserves are a loan at low interest rates. The revenue from it is the difference between the interest paid and the interest that would have been paid if the budget would have had to finance with bonds. The problem here is that the interest rates that the budget would have to pay for bonds in the absence of reserves are unknown as long as reserves are in place. The sheer existence of required reserves may increase market interest rates and may thus deliver an upwardly biased estimate. A final aspect that is often forgotten is the extent to which the central bank is willing to transfer this implicit tax income to the government through dividends or cheap credits. Konopielko (1997) did not take this issue into account.

It is not surprising therefore that Russia, with its huge budget deficits and its underdeveloped financial markets, applied reserve requirements. The Russian regime of required reserves changed frequently during 1991–95.[6] Before 1992, required reserves were 2 per cent of deposits. At the beginning of reforms in early 1992, the requirement was strengthened to 15 per cent on short-term deposits and 10 per cent on long-term deposits. Since March 1994 until the end of the period

[5] Konopielko (1997) estimates the implicit tax revenue for the government from reserve requirements in Hungary, Poland and the Czech Republic. Using the opportunity cost definition, he finds that the implicit tax revenue was on average 0.62 per cent of GDP for Poland in the period 1992–94, 0.59 per cent of GDP for Hungary in 1990–94 and around 0.4 per cent for the Czech Republic in 1992–93. Given the low level of development of the financial markets in these countries these estimates are comparable with those for Italy (Molho, 1992) and Spain and Portugal (Repullo, 1991), before the convergence process to EMU.

[6] According to article 27 of the banking law of the Russian Federation and article 23 of the statutes of the CBR, the CBR can oblige commercial banks to deposit required reserves on accounts with the CBR. A short list of regulations issued by the CBR to implement the system of required reserves in the period 1992–94 looks as follows:

– Instructions from the CBR, 30 April 1991, No. 1
– Telegram from the CBR, 29 December 1991, No. 218–91
– Letter from the CBR, 11 March 1992, No. 13–3–1/122
– Telegram from the CBR, 4 August 1992, No. 171–92
– Letter from the CBR, 15 February, 1994, No. 13–1/190
– Annex 1, 31 December 1994, No. 135

under study the required reserves amounted to 20 per cent on short-term rouble deposits and 15 per cent on long-term rouble deposits. Deposits have to be interpreted broadly as sources of funds. Some sources of funds are excluded. Interestingly, bonds, interbank credits and currency deposits were for example exempted from required reserves. Banks have to deposit required reserves in a special account with the CBR,[7] where the funds are frozen. Last but not least, required reserves bear no interest.[8]

We have now described how the system of required reserves should have looked, according to regulations. Unfortunately, in Russia there tends to be a substantial difference between regulations and reality. Under the weak assumption that less than 10 per cent of deposits were long term, the average reserve requirement was about 14.5 per cent of total rouble deposits from early 1992 until the end of February 1994 and about 19.5 per cent of total deposits since. However, the data in Table 3 tell a different story. Table 3 shows total rouble deposits, required reserves and their ratio. The legally imposed 14.5 per cent was first reached in October 1993 (14.6%), about two years after its implementation in early 1992. The 19.5 per cent imposed in March 1994 was still not reached in practice by end 1994, though the difference was getting small in the last quarter of 1994. The difference between the legal requirement and actual required reserves may be due to fraud and miscalculation in the assessment of required reserves. The IMF (1995) explains how the concrete calculation methods[9] created room for abuse. By shifting deposits among each other in a timely manner banks could easily abuse the calculation method to get a lower reserve requirement. Only in 1995 were these calculation methods altered. Laurila (1996) indicates that the CBR may have been physically unable to control the weekly reports of the more than 2500 banks that existed in 1994.[10] Therefore the theoretical heavy burden of required reserves may in practice be a lot less heavy, but still it remains at least substantial. It must certainly have reduced bank liquidity.

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[7] Required reserves are booked on the banks' balance accounts Nos. 816 and 681, which is mirrored on the balance of the CBR by accounts Nos. 815 and 680.

[8] The most important document for the 1994 regulatory framework is the letter from the CBR of 15 February 1994 (No. 13–1/190) and its adaptations of 31 December 1994 (No. 135) and of 29 March 1995 (No. 158). Androsov (1995) gives an overview of the procedures that are in effect since March 1994 and the various adaptations.

[9] In February 1994 the CBR introduced four methods to calculate the base for required reserves, between which banks were allowed to choose. These alternative bases were: 1) deposit balances as of the first day of the month, 2) deposit balances as of the 16th of the month, 3) daily averaged deposit balances and 4) the average of deposits held at the end of each six five-day periods in the month (Baliño, Hoelscher and Horder; 1997).

[10] Only in early 1993 was the banking supervision department of the CBR founded. The department was responsible for regulation, monitoring and research of the banking sector. It initially comprised three divisions, namely the division for bank licensing, lending institutions and bank audit, the division banking regulation and supervision and the division for economic analysis of banking. The department was founded with only about 70 relatively inexperienced employees for more than 2000 banks.

Table 3. Are required reserves really required?

	Required reserves (1)	Rouble deposits (2)	Ratio (1)/(2)
Mar92	86	1075	8.0%
Jun92	114	1488	7.6%
Sep92	254	3516	7.2%
Dec92	472	4372	10.8%
Mar93	731	6354	11.5%
Jun93	1227	10652	11.5%
Sep93	1895	13362	14.2%
Dec93	2710	18496	14.6%
Mar94	3603	22883	15.7%
Jun94	5431	34685	15.7%
Sep94	8119	44804	18.1%
Dec94	9863	56208	17.5%

Source: Granville (1995).

2.2 The paradox of excess reserves

Excess reserves are reserves voluntarily held by commercial banks on their correspondent accounts at the CBR. These reserves bear zero interest rates but are at the banks' free disposal. They should be a good indicator of the liquidity of banks. Table 4 shows data on required, voluntary and total reserves. Notwithstanding the apparent repression of banks by high required reserves, banks voluntarily held substantial excess reserves with the central bank. Excess reserves reached extremely high levels. They were four to five times higher than required reserves in 1992 and two to four times higher in 1993. Only at the end of 1994 did excess reserves reach levels comparable with those of required reserves At that time 18 per cent of rouble deposits were deliberately held as excess reserves. This is still remarkably high if we take account of the fact that average monthly inflation was 8 per cent in 1994. The excess reserves must have constituted a serious drain on real bank revenue. It seems as if commercial banks were not liquidity constrained at all by required reserves. This leaves us with a paradox.

Some authors have interpreted these high excess reserves as support for their thesis that bank liquidity was not constrained in early transition. This is however far too simple. In the literature we also find a number of other contributions that explain the observed high level of excess reserves, without implying that bank liquidity was genuinely high. Several arguments have been put forward, namely data problems, credit risk, payment system problems, and lack of alternatives.

Table 4. Excess reserves and required reserves compared

	Excess Reserves (1)	Rouble deposits (2)	Ratio ER/RD (3)=(1)/(2)	Ratio RR/RD (4) (Table 2)	Ratio (ER+RR)/RD (3+4)
Q1/92	306	1075	20.5%	8.0%	28.5%
Q2/92	705.5	1488	39.8%	7.6%	47.4%
Q3/92	1634	3561	39.2%	7.2%	46.5%
Q4/92	2521.9	4372	46.9%	10.8%	57.7%
Q1/93	2790.4	6354	43.9%	11.5%	55.4%
Q2/93	2716.9	10652	25.5%	11.5%	37.0%
Q3/93	4114.3	13362	30.8%	14.2%	45.0%
Q4/93	5751	18496	31.1%	14.6%	45.7%
Q1/94	6626	22883	29%	15.7%	44.7%
Q2/94	7748	34685	22.3%	15.7%	38.0%
Q3/94	10139	44804	22.6%	18.1%	40.8%
Q4/94	10100	56208	18.0%	17.5%	35.5%

Source: Granville (1995).

Sensenbrenner and Sunderarajan (1994) find that centralized credit resources were channeled to enterprises via the banks' correspondent accounts at the CBR. Due to the slow settlement system this artificially inflates the banks' correspondent accounts which are used to measure their reserves at the CBR. Sensenbrenner and Sunderarajan (1994) offer data series to correct this distortion. However, after their corrections there still remains an impressive amount of excess reserves.

The credit risk argument follows from the SBC-literature overview in the introduction. Why would banks prefer to voluntarily hold excess reserves and pay the price in the form of inflation tax? Berglöf and Roland (1995) give a theoretical answer. They study the behaviour of banks in a financial transition environment characterized by undercapitalized banks and poor loan portfolios. They show that 'banks themselves can reduce their incentives to gamble for bail-out, and thus credibly commit to hard budget constraints, by setting aside capital for liquidity reserves, or equity, rather than investing in projects' (Berglöf and Roland, 1995, p. 355). The empirical prediction is that banks with poorer loan portfolios would hold more liquidity reserves as a device to commit to hard budgets. There exists an alternative interpretation to this empirical prediction: If banks are not aware of the adverse incentive effects of high loan rates, they may set loan rates too high. This would imply poorer loan quality, lower loan demand and higher excess reserves.

Payment system inefficiencies are another factor, as explained by Baliño, Dhawan and Sunderarajan (1994). A typical consequence of an inefficient payment system, is the large size and variability of payment float. Large and unpredictable flows of payment float impede effective liquidity management by commercial banks and force them to hold large levels of excess reserves as a buffer against the variability of float. If payment float is large and unpredictable, so will be bank reserves, because of the inability of banks to manage their liquidity more efficiently in such a situation. This argument certainly applies to the Russian payment system in 1992–94. Hoggarth (1996) therefore rightly mentions that excess reserves are likely to fall as the Russian payment system becomes more efficient.

As pointed out by Granville (1995), banks had no alternative in the form of domestic interest-bearing reserves. Treasury bills, the famous 'GKO'[11] were introduced only in May 1993, and they became broadly accepted only in 1994. Moreover the auctions were initially held only in Moscow, and thus available only to Moscow-based banks. Gradually the CBR also started to hold regional auctions. If one constructs the sum of the stock of treasury bills and the stock of excess reserves, one observes that the relation between this sum and required reserves stays roughly constant in 1994. This supports the idea that banks have been substituting GKO for excess reserves. Before their existence, the unavailability of riskless interest-bearing reserves led banks to hold zero interest excess reserves at the central bank as a form of safe liquidity. The access to GKO will therefore decrease excess reserves, because it offers an alternative liquid investment. Another alternative investment for excess liquidity might be interbank loans, since interbank loans are short term and, contrary to excess reserves, do pay an interest rate. So we include a variable on interbank lending.

Another straightforward explanation, that however has not been put forward in the literature, is the interest elasticity of loan demand. Too high loan rates will logically decrease loans granted and hence will increase the level of excess reserves, given the lack of investment alternatives. This would mean that excess reserves are concentrated in banks with the highest loan rates.

Finally, it is possible that in 1992–94 banks were not liquidity constrained by required reserves and hence that excess reserves were a genuine sign of excess liquidity.

Khoo and Tsepliaeva (1994) tested these various explanations statistically, with aggregate data, and found no significance. They attributed high excess reserves to the slowness of the money creation process. We will test several explanations with the use of bank data.

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[11] GKO are zero-coupon bonds that are issued by the Ministry of Finance by American tender. In conformity with resolution no. 107 of the Ministry of Finance, the CBR acts as an agent for the Ministry of Finance and organizes the auctions of GKO. GKO were in 1993–94 only issued in Moscow. Moscow-based banks alone could reap the full benefit on the primary market, since the CBR started regional primary auctions of GKO only in 1995. At the time, non-residents were largely excluded from the GKO-market. As a rule foreign investors have been limited to a maximum of 10 per cent of every auction (Korhonen, 1997).

2.3 Hypotheses

We adopt a bank-based empirical approach to explore the various determinants of excess reserves at the level of a single bank. We know from Sensenbrenner and Sunderarajan (1994) that excess reserve data were distorted by the settlement of centralized credit resources. However, we cannot use their general corrections for our bank-based approach. Therefore we concentrate on 1994-data. This largely solves the measurement problem because at that time centralized credit resources were reduced to fairly small flows.

The dependent variable **ERTA** is defined as excess reserves, divided by total assets. The independent variables follow from the theoretical arguments in Section 2.2. To approximate the **flow of payments** we divide the current accounts of enterprises by total assets (**CATA**). We suspect that the amount of money on current accounts of enterprises is a good indicator for the flow of payments handled by the bank. We expect a positive sign for CATA: banks with high payment volumes should have high floats.

For **credit risk** we use the proportion of overdue loans to total assets (**BLTA**). Banks with large bad loan portfolios already have a large credit risk exposure and may be tempted to accumulate reserves rather than grant any further credits. We therefore hypothesize a positive sign for BLTA.

For **cash liquidity** we need an indirect measure. Any direct measure (asset ratio, current ratio, etc.) would involve excess reserves, since these are by far the main constituent of bank liquidity. But this would produce endogeneity problems since excess reserves are the independent variable. Therefore we use an indirect indicator of liquidity, namely dividend policy. Since we measure the balance at the end of the year, banks that have distributed all their profits to their owners, will have depleted their liquidity and will be less liquid at that point of time than banks that reserve all their profits. We include therefore a dividend variable (**DIV**), defined as dividends divided by total profit. The coefficient is expected to be negative. Another indirect indicator of liquidity is given by bank reserves as a proportion of total assets, corrected for the age of the bank (**RESTA**). Bank reserves are accumulated retained bank profits. One can interpret RESTA as a variable that captures the average DIV over time. If DIV is always 0, which is the case for some banks, than all profits were retained and RESTA will be high. If DIV is always 1, which is also the case for some banks, then all profits have been distributed and RESTA will be 0. The coefficient on RESTA is expected to be positive. If these variables are not significant, it means that banks have invested their retained profits proportionally into new loans, GKO, interbank loans, fixed assets and excess reserves. If we find significance, this means that banks with high profit retention rates have higher excess reserves, or in other words that banks have chosen to put retained profits in excess reserves rather than in other investments, such as credits. This would support the idea that high excess reserves are an indicator of excess liquidity.

To measure the effect of interest rates on loan demand, we introduce the loan rate **IL**, calculated as total interest revenue divided by total interest-earning

assets. With a standard loan demand function, high loan rates should affect loan demand adversely and, given the lack of alternatives, induce higher excess reserves. The coefficient is expected to be positive. However, one could argue that causality runs in the opposite direction: banks with more liquidity would in this scenario demand lower loan rates, conditional on credit demand. We risk mixing supply and demand effects and hence ending up with inconsistent and biased estimates if we do this. Therefore we apply a two-stage least squares procedure with IL as an endogenous variable. This procedure assures consistent and unbiased estimates of the coefficients.

The lack of alternative investment opportunities can be captured by data on GKO. We have data for all banks on the rouble amount invested in state bonds, mainly GKO. Bonds can be held by anyone, but primary sales of GKO were held only in Moscow during 1993–94. Also on secondary markets they were distributed mainly in and around Moscow.[12] Therefore we assume that GKO were mainly held by Moscow banks and that in Moscow the data on state bonds mainly contained GKO. We approximate the amount of GKO as follows:

$$\textbf{\textit{GKO}} = MOSCOW * (\text{state bonds/total assets}),$$

with MOSCOW equaling 1 for Moscow-based banks and 0 in all other cases. Since we hypothesize a substitution of GKO for reserves, we expect a negative coefficient for GKO.

As an alternative investment we also include interbank lending. We measure interbank lending (**IBLTA**) as total interbank loans / total assets.

The capability of efficient **liquidity management** is measured by two variables. We use the log of total assets (**LOGTA**) and the log of the age of the bank (**LOGAGE**). The explanation for LOGTA is obvious. Larger banks have higher but less variable payment flows and have the resources to invest in efficient liquidity management. Therefore the coefficient on LOGTA is expected to be negative. LOGAGE is less straightforward. We assume that there exist considerable learning effects in liquidity management. We assume that this learning process is exponential with time. Therefore we use the log of the age of Russian commercial banks. In our sample all banks are between one and seven years old. The older banks are expected to have learned over time to manage liquidity more efficiently. Therefore LOGAGE is expected to have a negative coefficient. LOGTA and LOGAGE can also be interpreted as **control variables** that control for scale and age.

Last we introduced a number of **dummy control variables**, namely **NATREG**, a dummy for banks operating on a national or regional scale and **STATE**, a

[12] The secondary trade in GKO was conducted by licensed dealers at MICEX. In 1996, 6 regional dealers were linked to the MICEX-trading system, but the trading volume was small. Regional banks were *de facto* excluded. Also foreigners were initially excluded from the secondary market (Malievsky, 1996). We conclude that secondary trading was *de facto* reserved for Russian Moscow-based banks.

dummy for the origin of the bank. The separate introduction of the dummy **MOSCOW,** next to the variable GKO, avoids the possibility that we wrongly conclude that GKO is significant, while in reality this would only be due to the inclusion of MOSCOW in its calculation. Indeed, if that would be the case, GKO would be rejected as insignificant and MOSCOW would be accepted by the data. The precise definition of these three dummy variables is given in the next section.

3. The data

3.1 Data collection

We collected a considerable number of accounts of Russian banks in 1994. We use sample D(1994) of Schoors (2000), which contains data on 126 banks. The data collection procedures and the tests to which the data were submitted are described in detail in Schoors (2000).

It is generally accepted that, out of the more than 2,500 banks that were officially registered by end-1994, only around 1,000 were genuinely operating as banks. Since I selected only banks that can be considered as genuine banks, sample D(1994) represents about 12.6 per cent of the number of active banks. Comparing total assets in our sample with total assets in the population (with the exclusion of Sberbank), sample D(1994) represents 10.9 per cent of total bank assets. This is a strong under-estimation of the underlying representativeness, since only genuine banks were selected for sample D(1994), while the population contains the assets of all registered banks. Table 5 gives an overview of the representativeness of the sample.

Table 5. Representativeness of the samples

As of 1 January 1995	Number of banks		Total assets (bn roubles)	
	Genuinely operating banks	Samples as % of the population	All registered banks	Samples as % of the population
Bank population	±1000		322445	
Sample D(94)	126	12.6%	35102	10.9%

To check the representativeness of the samples in more detail, we classified according to three criteria: Is the bank Moscow-based or not, is the bank local, or rather a regional or even national player, and is the bank a successor of a (part of) a former state bank or not?

The operational definitions of the criteria are:

Moscow-based banks
These are banks with the official address of headquarters in Moscow according to the register of the CBR. This category is important because Moscow developed into the financial capital of the country and therefore has special characteristics.

National banks
These are banks with branches in at least three Russian regions, other then the Central Moscow region. Their scope of operation is deemed to be national.

Regional banks
These are banks with at least five branches in a particular region. They are large in their region, but often not important outside it.

State banks
In Russia these banks are commonly referred to as banks founded on the basis of one of the former specialized banks. These banks are not genuine state banks but rather the successors of a branch, a local department, a regional department or a sectoral department of one of the formerly state-owned specialized banks. They were in a large part founded in the process of decentralized spontaneous privatization of 1990–92.[13] These banks are private banks, founded on the basis of one of the specialized state banks and often retaining good connections with the state. The predicate 'state' refers to their origin (and possibly to certain common characteristics that follow from it) and not to property relations.

In practice we use three dummy control variables for the bank's type, namely MOSCOW, STATE, and NATREG. NATREG is the union of NAT and REG. The combination of three dummy variables allows 8 different combinations, ranging from private, small, local banks (all dummies are 0) to Moscow-based large state banks (all dummies are 1). Figure 2 gives an overview of the 8 different classes of banks and Table 6 gives the structure of our sample according to these 8 classes. Comparing the sample distribution to the population distribution is difficult, because there is no detailed information on the population distribution. The CBR (1994) notes that at the beginning of 1994, 609 of the 2041 registered banks are actually successors of the former state bank, which amounts to 29.8 per cent.[14] This is the last time the CBR disclosed data on the history of banks. Since many of the 2,041 banks were not operational, the actual presence of state banks may even be larger. This shows that the strong presence of former state banks in our sample

[13] One of the main sources of bank creation between 1990 and 1992 was the process of splitting, corporatization and spontaneous privatization of the former specialized state banks. For convenience we will in this work refer to banks that were founded on the basis of a former state bank (a SB) as 'state banks'. Spontaneous privatization means that individual branches, local departments or regional departments of former state banks declared themselves independent and registered as independent banks. The founding shareholders were typically the largest clients of the departments concerned.

[14] Of these 609 banks, 42.7 per cent were successors of Agroprombank, 28.2 per cent were successors of Promstroibank and 20.2 per cent were successors of Zhilsotsbank.

is not necessarily an over-representation. Both big banks and small banks are present in our study. Small local banks may seem to be under-represented if their number is considered, but considering their small impact on the banking system as a whole, this is justified. Last, the share of Moscow banks in our sample is similar to the population characteristics (about 30 per cent).

Figure 2. The classification of banks according to three criteria

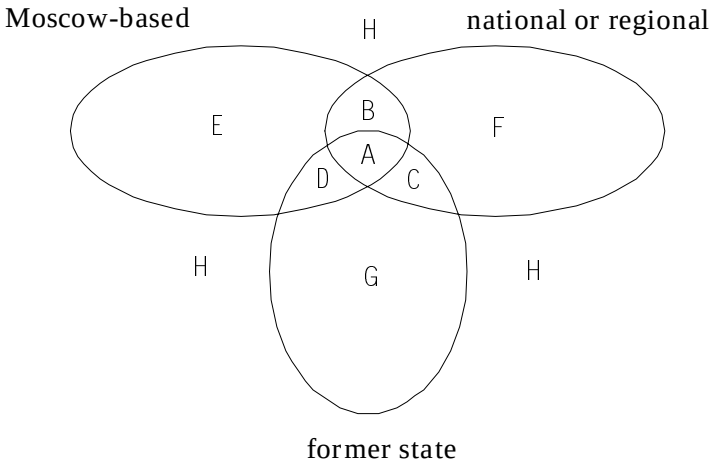

Table 6. Sample structure according to bank type

	Sample D
A	3
B	6
C	21
D	3
E	26
F	9
G	23
H	35
Former state banks (= A + C + D + G)	50
Moscow-based banks (= A + B + D + E)	38
National or regional banks (= A + B + C + F)	39
Private small local banks (= H)	35
Total	126

4. Methodology, results and interpretation

We tested the hypotheses of Section 2 with a two stage least squares procedure. The dependent variable is ERTA. The independent variables are described in Section 2. IL is modelled as an endogenous variable, in order to avoid joint supply and demand effects. All other independent variables (including the constant) are used as instruments. In order to fulfill the order condition one additional instrument had to be included. We used the share of foreign currency deposits in total assets (CURRTA) as an additional instrument. In the first regression we include all variables. In the second regression we exclude the two sets of control variables (LOGTA, LOGAGE, NATREG, MOSCOW, STATE), because they are insignificant. In equation 3 we also exclude DIV and IBLTA because of insignificance. In equation 4 we exclude IL, because it is only moderately significant in equation 3. Since the endogenous variable is excluded, we apply an OLS for equation 4. Results are presented in Table 7.

In equation 1, we show the basic regression that tests our main hypotheses. It follows from Table 7 that all control variables are insignificant. The control variables are consequently dropped in equation 2. In equation 2 all independent variables are significant, with the exception of DIV, IBLTA and IL. In equation 3 we drop the DIV and IBLTA. All remaining independent variables show significant coefficients. The least significant variable is IL. In equation 4 we drop the loan rate IL and find again that all independent variables are significant.

Further inspection of the equations yields the following conclusions. None of the equations in Table 7 rejects the hypothesis that the inefficiency of the payment system has contributed to high excess reserves. This is shown by the high significance of CATA in all equations. Therefore we can expect that excess reserves will decrease if the efficiency of the payment system increases.

The role of loan demand is positive, as hypothesized. In equation 3, where all insignificant variables are dropped, the coefficient for IL becomes significant, even though only moderately. The sensitivity analysis in Table 8 of Section 5 will indicate that the significance of IL is stronger than apparent from Table 7.

The hypothesis that banks invest liquidity in excess reserves because of lack of alternatives cannot be rejected. This is shown both by the negative sign and the significance in all equations of GKO, our variable on treasury bills. Interbank lending is rejected though as an alternative for liquidity management. Banks that are active in the GKO-market appear to hold less excess reserves than other banks. The introduction of the dummy MOSCOW in equation 1 does not alter these conclusions. The coefficient of GKO remains significant and stable, and MOSCOW is rejected. One must cautiously interpret this negative coefficient since a real substitution effect would require a negative correlation in changes rather than a stable negative correlation in levels. Note however that GKO can be interpreted as a flow variable, since GKO were only fully introduced in December

1993.[15] Therefore the data point at end-1994 is the first GKO stock variable significantly different from 0 and hence can be interpreted as the first GKO flow variable. Hence, the negative correlation between GKO and ERASS certainly indicates that at least part of the excess reserves constitute excess liquidity.

Credit risk (BLTA) is significant in all equations, but it does not exhibit the expected sign. Apparently banks with poor loan portfolios have been depleting reserves in order to keep afloat, rather than accumulating reserves as a reaction to bad loans. An explanation might be that bad banks with bad loans are transferring liquid capital elsewhere (asset stripping). Another explanation for the negative sign might be that banks that hold bad loans are rationed on the interbank market and therefore have lower liquidity. We tested this by introducing interbank borrowing, without much effect. The unexpected sign might also be due to a specification error. Indeed, one could imagine a quadratic relation between ER and BLTA, where banks with relatively poorer bad loan portfolios accumulate excess reserves to enhance hard budget credibility up until a certain optimum. Beyond this point bad loans are so dramatically high that banks are depleting excess reserves to survive and the relation between ER and BLTA is reversed. However, after the introduction of a quadratic term $BLTA^2$, both BLTA and $BLTA^2$ became insignificant. This specification is therefore also rejected by the data. This means that the Berglöf and Roland conjecture is rejected on the individual bank level. They may be still right on a systemic level however: bank systems with inherent bad loan quality may hold more excess reserves than bank systems with high loan quality. However our hypothesis that the differences among banks within the Russian banking system might be explained by loan quality differences, is rejected.

This is supported also by the strong significance and the positive sign of RESTA in all equations of Table 7 (and also Table 8). Precisely the banks that have historically retained most earnings (and *ceteris paribus* are most liquid) seem to have accumulated excess reserves, rather than the banks with bad loan problems.[16] This does not allow us to reject the hypothesis of excess liquidity in the Russian banking system. Indeed, banks that retain earnings seem to accumulate excess reserves, rather than to lend more money.

The hypothesis on the efficiency of liquidity management on the other hand is rejected, by the insignificance of LOGTA and LOGAGE. Also the other control variables are insignificant.

[15] Only in December 1993 the first GKO with maturity of six months were introduced. It is only after this innovation that the GKO-market acquired a significant scale in 1994.

[16] But they may be doing so because of systemic bad loan quality, so Berglöf and Roland may still be right on a systemic level. Credit risk may not influence the variation of excess reserves within Russia but rather the average level of Russian excess reserves when compared to other countries.

Table 7. Excess reserves analyzed

Methodology	Expected sign	Eq (1)	Eq (2)	Eq (3)	Eq (4)
Type of regression		TSLS	TSLS	TSLS	OLS
Additional Instrument		CURRDEP	CURRDEP	CURRDEP	
Constant		–0.041	–0.002	–0.0033	0.0213***
		(0.580)	(–0.066)	(–0.222)	(3.567)
Payment system					
CATA	+	0.173***	0.172***	0.171***	0.19***
		(4.558)	(4.572)	(4.589)	(5.611)
Credit risk					
BLTA	+	–0.232**	–0.230**	–0.232**	–0.123*
		(–2.497)	(–2.288)	(–2.37)	(–1.918)
Indirect liquidity					
RESTA	+	2.999**	2.701**	2.71**	3.671***
		(2.254)	(2.226)	(2.432)	(4.032)
DIV	-	0.0028	0.0024		
		(0.331)	(0.287)		
Alternative investment					
GKO	-	0.336*	–0.28 *	–0.281*	–0.369***
		(–1.773)	(–1.879)	(1.896)	(–2.801)
IBLTA	-	–0.0114	–0.008		
		(–0.228)	(–0.11)		
Interest rates (endogenous)					
IL	+	0.0609	0.0534	0.0557*	
		(1.51)	(1.127)	(1.674)	
Control variables I: Liquidity management					
LOGTA	-	0.0038			
		(0.496)			
LOGAGE	-	0.007			
		(0.324)			
Control variables II: dummies					
NATREG	-	–0.0037			
		(–0.415)			
MOSCOW		0.0055			
		(0.406)			
STATE		0.00017			
		(0.0179)			
Adjusted R^2		0.213	0.260	0.267	0.273
F-statistic		2.01	7.774	10.475	12.756

Notes: White heteroskedasticity-consistent standard errors and covariance. *, ** and *** denote significance at the 1 per cent, 5 per cent and 10 per cent levels, respectively.

5. Sensitivity analysis

We tested the data and excluded a number of banks because they were not operational or not trustworthy (see Schoors, 2000 for the selection criteria). It is possible that we have not been selective enough and that our sample still contains some observations that should have been omitted from the sample. To verify whether our results are sensitive to some extreme observations we calculated bootstrapped coefficients and T-statistics.

Table 8. Bootstrapped results

Bootstrapped equations of Table 7	Expected sign	with obs. 43 (126 obs.)		without obs. 43 (125 obs.)	
		3	4	3	4
CATA	+	0.176***	0.191***	0.185***	0.204***
		(0.171)	(0.190)	(0.183)	(0.203)
		((4.912))	(5.486)	((5.489))	((5.970))
BLTA	+	–0.236**	–0.125*	–0.269***	–0.148**
		(–0.232)	(–0.123)	(–0.261)	(–0.145)
		((–2.298))	((–1.855))	((–2.537))	((–2.254))
RESTA	+	2.497*	3.536***	3.187**	4.121***
		(2.709)	(3.671)	(3.29)	(4.284)
		((1.866))	((2.778))	((2.432))	((3.639))
GKO	-	–0.274*	–0.358***	–0.307 **	–0.398***
		(–0.281)	(–3.671)	(–0.316)	(–0.407)
		((–1.895))	((–2.568))	((–2.157))	((–2.954))
IL	+	0.0556*		0.0599*	
		(0.0557)		(0.0588)	
		((1.676))		((1.799))	

Notes: Bootstrapped mean, observed mean in brackets, bootstrapped T-statistics in double brackets. *, ** and *** denote significance at the 1 per cent, 5 per cent and 10 per cent level, respectively.

In Table 8 we show bootstrapped results for equations 3 and 4. We show the bootstrapped mean of the coefficient, between brackets the observed coefficient according to the methodology of Section 4, and between two brackets the T-statistic of the bootstrapped mean. The difference between the bootstrapped mean and the observed mean is the bias that follows from sample construction. We bootstrap only the meaningful equations 3 and 4. A Jackknife-test revealed that one observation (observation 43) had a strong impact on the bootstrapped results. Inspection of this observation showed that the data point for RESTA was just below the outlier criterion (three standard errors away from the mean). Therefore

we repeated the sensitivity analysis without this 'outlier', to see whether our results are affected by it. We found that our results do not depend on observation 43. In fact, without the observation all coefficients keep their signs and increase their significance, though all coefficients seem to increase a bit. Therefore we can safely claim that the interpretation of our results is not dependent on the sample construction.

6. Concluding remarks

The analysis shows that the massive excess reserves held by Russian commercial banks in 1994 should not be interpreted unambiguously as an indication of excess liquidity. Theory indicates that the enormous scale of excess reserves is to a large extent explained by payment system inefficiencies, loan demand effects and the lack of investment alternatives. The empirical verification could not decisively reject any of these hypotheses. In addition excess reserves had already reached moderate levels in 1994, when compared to 1992 or 1993. On the other hand, the hypothesis that high excess reserves were at least partially a sign of excess liquidity cannot be rejected either: banks with higher retained earnings have higher excess reserves and banks with more bad loans seem to deplete excess reserves. It is possible that a number of individual banks faced liquidity problems by the end of 1994. Our analysis however indicates that the commercial banking sector as a whole was not liquidity constrained, but rather holding excess liquidity.

We cannot unambiguously reject the lending channel because of the methodological limitations inherent to our approach. Still it would seem strange that the high level of genuine bank liquidity in 1994, found empirically in this paper, could have sustained a lending-channel-induced credit crunch of the scale observed in Russia in the period under study. So I would say it is safe to claim that we have found strong indications, though not proof, that the observed credit crunch was not mainly a consequence of too restrictive monetary policy transmitted through the lending channel and hence that the decline in production in 1992–94 cannot be blamed on monetary policy. Our analysis of bank liquidity seems to suggest that in 1994, the banking system preferred to hold excess liquidity rather than grant credit to the real economy. There must be structural reasons why banks were not granting credits to the economy even if they had the needed liquidity. These reasons may lie in a number of inherent deficiencies of Russia's emerging market economy. Part of these deficiencies are to be found in the general economic shocks following transition from plan to market and the specific shocks to credit markets following bank decentralization and privatization. Probably even more important, the structurally inefficient and unreliable economic system and the soft budget environment that followed from it might have had a large influence. There remains the possibility that the balance

sheet channel, which was not analyzed in this paper, played a role in the transmission of monetary policy. Still we think that the creditworthiness of enterprises was more affected by transition problems than by interest shocks, following monetary policy. Transition is the heart of the problem, not monetary policy.

Our approach may provide some guidance for the correct interpretation of current events. Since early 1999, banks have again accumulated excess reserves and the CBR has reacted by increasing required reserves in several steps. Still, excess liquidity reappeared after each upward shift in required reserves. As in 1994, the Russian banking sector as a whole is again holding excess reserves though these are now remunerated. Obvious explanations are again the lack of investment alternatives. The GKO market collapsed and the interbank market came close to a complete standstill. Increased payments settlement took place though the CBR-system because many of the banks at the heart of the payment system collapsed. But high bank liquidity cannot be rejected. Instead of a credit crunch we observe that rouble credit in real terms increased in 1999, albeit quite moderately and continues to increase moderately in 2000. Also, the period from 1999–2000 has seen the strongest ever post-Soviet growth performance of the Russian economy. Corporate profitability has increased, barter has decreased, tax revenues have soared. In 1994, we observed excess liquidity, a credit crunch and negative real growth. In 1999 there was again excess liquidity, but there was no credit crunch and we observed positive growth, which continued in 2000. The difference is not in monetary policy (required reserves and a managed float of the Russian rouble in both cases), but in the economic environment, which seems finally to be improving.

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